

CLAIMS

WHAT IS CLAIMED:

1. A method for determining the suitability of a copper line, used for transmitting voice band signals and having one or more user devices coupled thereto for transmitting signals on the copper line, for use in transmitting data signals out-of-band with the voice band signals, the method comprising:

applying a test signal at one point in the copper line, the test signal having a known relationship to a particular out-of-band data transmission scheme;

monitoring a response of the copper line to the test signal, as influenced by the one or more user devices, wherein the monitoring takes place at about the point where the test signal was applied; and

determining the suitability of the copper line for data transmission using the particular out-of-band data transmission scheme based on the monitored response of the copper line.

2. The method of claim 1, wherein the particular out-of-band data transmission scheme comprises a digital subscriber line (xDSL) transmission scheme.

3. The method of claim 2, wherein the particular out-of-band data transmission scheme comprises an asymmetric digital subscriber line (ADSL) transmission scheme.

4. The method of claim 1, wherein the one or more user devices comprise a plurality of user devices including at least one telephone and at least one computer.

5. The method of claim 4, further comprising determining a need for a filter at a location of at least one of the telephone and the computer to separate voice band signals and out-of-band data signals transmitted on the copper line.

5 6. The method of claim 1, wherein the copper line includes a copper network within a subscriber's premise used to provide telephone service to the subscriber.

7. The method of claim 6, wherein the copper line further includes a subscriber line connecting the subscriber's premise to a central office of a telephone service provider.

10 8. The method of claim 1, wherein determining the suitability of the copper line includes determining whether any of the one or more user devices has a non-linear characteristic.

15 9. The method of claim 1, wherein determining the suitability of the copper line includes comparing the monitored response of the copper line with an empirically derived template defining a suitable response limit for the copper line.

20 10. The method of claim 1, wherein applying the test signal comprises injecting a modulated signal on the line at a frequency corresponding to the particular out-of-band data transmission scheme.

11. The method of claim 10, wherein monitoring the response of the copper line includes determining whether the modulated signal at the frequency corresponding to the particular out-of-band data transmission scheme is demodulated.

12. The method of claim 11, wherein determining the suitability of the copper line includes comparing the monitored response of the copper line with an empirically derived template defining a suitable response limit for the copper line.

5 13. A device for determining the suitability of a copper line, used for transmitting voice band signals and having one or more user devices coupled thereto for transmitting signals on the copper line, for use in transmitting data signals out-of-band with the voice band signals, the device comprising:

10 a signal generator coupled to the copper line at one point, the signal generator providing a test signal to the copper line, the test signal having a known relationship to a particular out-of-band data transmission scheme;

15 a monitoring circuit coupled to the copper line at substantially the same point as the signal generator to monitor a response of the copper line to the test signal, as influenced by the one or more user devices; and

a processing unit coupled to the monitoring circuit to receive the monitored response of the copper line to the test signal and to output an indication of the suitability of the copper line for use in transmitting data signals using the particular out-of-band data transmission scheme.

20 14. The device of claim 13, wherein the copper line includes a copper network within a subscriber's premise used to provide telephone service to a subscriber associated with the subscriber's premise.

15 The device of claim 14, wherein the copper line further includes a subscriber line
local loop connecting the subscriber's premise to a central office of a telephone service provider.

5 16. The device of claim 13, wherein the monitoring circuit comprises a current to
voltage transducer that monitors an amount of current delivered by the signal generator into the
copper line.

10 17. The device of claim 13, wherein the monitoring circuit comprises:
a resistor coupled in series between the signal generator and the copper line to monitor an
amount of current delivered by the signal generator into the copper line;
an operational amplifier having a first input coupled to a first side of the resistor and a
second input coupled to a second side of the resistor and having an output to
provide an output signal that is directly proportional to the current drawn from the
15 signal generator by the copper line; and
an analog-to-digital converter coupled to the output of the operational amplifier, the
output signal from the output of the operational amplifier being provided to the
processing unit as the response of the copper line to the test signal.

20 18. The device of claim 13, further comprising a memory arrangement coupled to the
processing unit for storing an empirically derived template defining a limit for a suitable
response of the copper line to the test signals for the particular out-of-band data transmission
scheme.

19. The device of claim 18, wherein the processor is adapted to compare the monitored response of the copper line with the empirically derived template and output an indication that the copper line is suitable for the particular out-of-band data transmission scheme when the monitored response is within the limit defined by the empirically derived template.

20. A method for determining the suitability of a copper line, used for transmitting voice band signals and having one or more user devices coupled thereto for transmitting signals on the copper line, for use in transmitting data signals out-of-band with the voice band signals, the method comprising:

applying a test signal to the copper line at one point within a subscriber's premises, the test signal having a known relationship to a particular out-of-band data transmission scheme;

monitoring within the subscriber's premises at the point the test signal was applied a response of the copper line to the test signal, as influenced by the one or more user devices; and

determining the suitability of the copper line for data transmission using the particular out-of-band data transmission scheme based on the monitored response of the copper line.

21. A test unit for determining the suitability of a copper line, used for transmitting voice band signals and having one or more user devices coupled thereto for transmitting signals

on the copper line, for use in transmitting data signals out-of-band with the voice band signals,
the device comprising:

a signal generator for coupling to the copper line at one point, the signal generator
providing a test signal to the copper line, the test signal having a known relationship to a
5 particular out-of-band data transmission scheme;

a monitoring circuit coupled to the copper line at substantially the same point as the
signal generator to monitor a response of the copper line to the test signal, as influenced by the
one or more user devices; and

a processing unit coupled to the monitoring circuit to receive the monitored response of
10 the copper line to the test signal and to output an indication of the suitability of
the copper line for use in transmitting data signals using the particular out-of-band
data transmission scheme.

22. A communications system, comprising:

a communication line;

a plurality of user devices coupled to the communication line; and

a computer system coupled to the communication line, the computer system comprising:

a modem adapted to communicate over the communication line using an out-of-
band data transmission protocol; and

20 a test unit adapted to determine the suitability of the communication line for use
in transmitting data signals using the out-of-band data transmission
protocol, the test unit being adapted provide a test signal having a known
relationship to the out-of-band data transmission protocol on the

communication line, monitor a response of the communication line to the test signal as influenced by the user devices, and output an indication of the suitability of the communication line for use in transmitting data signals using the particular out-of-band data transmission protocol based on the response.


23. The system of claim 22, wherein the particular out-of-band data transmission protocol comprises a digital subscriber line (xDSL) transmission protocol.

24. The system of claim 22, wherein the computer system is adapted to contact a vendor for supplying service using the out-of-band data transmission protocol over the modem.

25. The system of claim 24, wherein the computer system is adapted to provide the vendor with physical location information associated with the communication line and receive service availability data based on the physical location information.

26. The system of claim 22, wherein the computer system is adapted to instruct a user to disconnect certain ones of the user devices from the communication line, and the test unit is adapted to iterate its functions of providing the test signal, monitoring the response, and outputting the indication of the suitability of the communication line for each disconnection.

27. The system of claim 26, wherein the computer system is adapted to identify an interfering device from among the user devices based on the iterative responses generated by the test unit.

5  28. The system of claim 27, wherein the computer system is adapted to recommend installation of a local filtering device between the interfering device and the communication line.

29. The system of claim 28, wherein the local filtering device comprises at least one of a filter and a splitter.

10 30. The system of claim 22, wherein the test unit is adapted to store an empirically derived template defining a limit for a suitable response of the communication line to the test signals for the particular out-of-band data transmission protocol, compare the monitored response of the communication line with the empirically derived template, and output an
15 indication that the communication line is suitable for the particular out-of-band data transmission protocol in response to the monitored response being within the limit defined by the empirically derived template.

20 31. A method for determining the suitability of a communication line for transmitting data using an out-of-band data transmission protocol, the communication line having a plurality of user devices attached thereto, and the method comprising:

providing a test signal on the communication line having a known relationship to the out-of-band data transmission protocol;

monitoring a response of the communication line to the test signal as influenced by the
user devices;

determining the suitability of the communication line for use in transmitting data signals
using the particular out-of-band data transmission protocol based on the response;

5 disconnecting at least one of the user devices from the communication line; and

repeating the providing, monitoring, and determining steps to determine if the at least one
user device disconnected from the communication line is an interfering device.

10 32. The method of claim 31, further comprising iteratively disconnecting each of the
user devices and repeating the providing, monitoring, and determining steps to determine if any
of the user devices disconnected from the communication line are interfering devices.

15 ~~Sub~~ 33. The method of claim 31, wherein providing the test signal comprises providing
the test signal having a known relationship to a digital subscriber line (xDSL) transmission
protocol.

34. The method of claim 31, ~~further comprising~~ contacting a vendor for supplying
service using the out-of-band data transmission protocol.

20 35. The method of claim 34, further comprising:
providing the vendor with physical location information associated with the
communication line; and
receiving service availability data based on the physical location information.

36. The method of claim 31, further comprising installing a local filtering device between the interfering device and the communication line.

5 37. The method of claim 36, wherein installing the local filtering device comprises installing at least one of a filter and a splitter.

38. The method of claim 31, further comprising:
comparing the monitored response of the communication line with an empirically derived
10 template defining a limit for a suitable response of the communication line to the
test signals for the particular out-of-band data transmission protocol; and
determining that the communication line is suitable for the particular out-of-band data
transmission protocol in response to the monitored response being within the limit
defined by the empirically derived template.

15 39. The method of claim 31, further comprising determining a need for a filter at a location of at least one of the user devices to separate voice band signals and out-of-band data signals transmitted on the copper line.

20 40. The method of claim 31, wherein monitoring the response of the communication line to the test signal includes determining whether any of the user devices has a non-linear characteristic.

41. The method of claim 31, wherein providing the test signal comprises injecting a modulated signal on the communication line at a frequency corresponding to the particular out-of-band data transmission protocol.

5 42. The method of claim 41, wherein monitoring the response of the communication line includes determining whether the modulated signal at the frequency corresponding to the particular out-of-band data transmission protocol is demodulated.

10 43. A method for determining the suitability of a communication line for transmitting data using an out-of-band data transmission protocol, the communication line having a plurality of user devices attached thereto, and the method comprising:

monitoring a response of the communication line to a test signal as influenced by the user devices;

disconnecting at least one of the user devices from the communication line; and

15 repeating the monitoring to determine if the at least one user device disconnected from the communication line is an interfering device.

20 44. The method of claim 43, further comprising iteratively disconnecting each of the user devices and repeating the monitoring to determine if any of the user devices disconnected from the communication line are interfering devices.

45. A program storage device, encoded with instructions that, when executed by a computer, perform a method, the method comprising:

receiving a first indication related to whether a communication line is suitable for a particular out-of-band data transmission protocol;
instructing a user to disconnect at least one user device from the communication line; and
receiving a second indication related to whether the communication line is suitable for
5 the particular out-of-band data transmission protocol after disconnection of the user device; and
designating the user device as an interfering device in response to the first indication being negative and the second indication being affirmative.

10 46. The program storage device of claim 45, wherein the method further comprises:
iteratively instructing the user to disconnect each of a plurality of user devices;
receiving a plurality of indications related to whether the communication line is suitable
for the particular out-of-band data transmission protocol after disconnection of
each of the user devices; and
15 designating particular ones of the user devices as interfering devices in response to the
indication received after disconnection of the particular user device being
affirmative and the indication received prior to disconnection of the particular
user device being negative.